

The Use of Assistive Technology for People with Special Needs in the UAE

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Abstract

Today, technology has become an essential part of the everyday educational setting. Its use has proven to facilitate learning and communication of many students with and without disabilities. Assuredly, assistive technology (AT) has transformed education and empowered students with disabilities. However, research studies investigating AT for students with special needs in the United Arab Emirates (UAE) are limited, if any. Quantitative and qualitative data collection methodology were used to explore the AT tools, services, barriers, and professional development available in the UAE special needs centers. Results showed that different AT devices existed according to the types of disabilities. In addition, results revealed different types of barriers hindering the use of AT. Results may shed light on the use of AT in the UAE, teachers' perceptions towards this use and barriers impeding such use. Recommendations and suggestions to improve the use of AT wherever and whenever needed in the UAE are discussed.

The Use of Assistive Technology for People with Special Needs in the UAE

Today, technology has become an integral part of our lives. Advances in technologies have revolutionized our conception of teaching and learning. Indeed, technology has enabled huge access to education and increased the learning opportunities for all learners. A more diverse group of learners can now access a wealth of educational materials and other resources with the help of technology. Undoubtedly, available adequate technology has maximized the learning and employment opportunities for people with disabilities. AT enables students with special needs to become more efficient and independent in completing their tasks and their overall performance. Nowadays, many students with disabilities use a variety of assistive technologies to help them become more functional.

The term assistive technology was first introduced in the Technology-Related Assistance for Individuals with Disabilities Act of 1988 (P.L. 100-407, better known as "Tech Act, ". The term is broken into two branches: assistive technology services and assistive technology devices. The term "AT device" is historically defined as equipment that is used to enhance or maintain the functional capability of an individual with a disability (Edyburn, 2003). An assistive technology service is any service that assists a child with disabilities and their family members in the

selection and use of the assistive device. Subsequently, the appropriate selection and use of AT enables individuals to complete tasks and perform more efficiently and independently than otherwise possible (Edyburn, 2000).

The AT services also includes providing technical training services for professionals who work with persons with disabilities. As for the term assistive technology devices, the Individuals with Disabilities Education Improvement Act of 2004 (IDEA, 2004) defines AT devices as "any item, piece of equipment or product system whether acquired commercially or off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" [20 U.S. Congress (1988) 1401\$602 (1) (A)]. AT varies from low-to high-technology devices. Examples of AT tools include, but are not limited to, audiotapes, compact discs, videos, electronic-based reference books, amplification devices, Braille note-taking devices, and electronic alternative and augmentative communication (AAC) systems such as speech synthesizers and augmentative communication boards (Bryant & Bryant, 2003; Friend & Bursuck, 2002). AT can address many types of disabilities. Students with autism, hearing impairment, and visual impairment are a few examples of those special needs people who can benefit from the huge opportunities the AT may provide.

In spite of the dramatic advances in AT, one of the most prominent difficulties that special needs people still face is the availability of the AT tools. Unfortunately, many people with disabilities are still deprived of access to the suitable type of technology that will help them to be more empowered themselves. Without access to high-tech tools, like computers and other AT devices, students with disabilities will be unable to pursue postsecondary education and career options like their peers without disabilities, they must have access to the high-tech tools. These tools include computers, websites, telecommunications products, instructional software, and scientific equipment (Burgstahler, 2003). In order for students to have full access, all physical barriers to tools as well as facilities to be removed and appropriate AT be made readily available (National Center for Education Statistics, 2000; Schmetzke, 2001).

Although the benefits of technology may be even greater for people with disabilities than for people without disabilities (Goldberg & O'Neill, 2000; Hasselbring & Glaser, 2000), individuals with disabilities are less than half as likely as their non-disabled counterparts to own computers, and they are about one-quarter as likely to use the Internet (Kaye, 2000). In addition, the design of many Web pages, instructional software programs, productivity tools, telecommunications products, and other electronic and information technologies do not take into consideration the limitations of some individuals with disabilities (Burgstahler, 2002; Opitz, Savenye, & Rowland, 2003; Schmetzke, 2001). For example, Web pages that do not include text alternatives that can be read by speech and Braille output systems limit information access by a student who is blind or has a reading disability; a videotape that does not have captions does not allow access for deaf viewers; software with a high reading level may not be accessible to people with learning disabilities or developmental disabilities; and devices which are not modified to meet the needs of a physically impaired individual are inaccessible.

Having stated the above, one must note that access to AT is not enough. Special education teachers of today face serious challenges regarding their knowledge and skills of AT. Special education teachers and administrators need to be educated on the availability of the latest advances in technological tools and their use (Edyburn, 2005). Similarly, special needs students

and their care-givers need to be assisted in the selection of a variety of AT that best meets their needs, trained in how to use the adequate AT, and supported to maximize the benefit.

Unfortunately, many special educators and administrators are not aware of the varied types of technology and how it can benefit their students, nor are they prepared to implement AT devices effectively (Edyburn, 2006; Parette, Peterson-Karlan, Wojcik, Watts & Stoner, 2007). What is the use of having access to a tool if it is not used effectively? The IDEA law of 2004 mandates training special needs students, their families and their teachers on how to use such technological tools (IDEA, 2004). In order for desired outcomes to be achieved, technological tools must be adequately matched to students' needs. Otherwise, students will not be able to benefit from such access (MacArthur, Ferretti, Okolo & Cavalier, 2001; Wong, 2001).

Unfortunately, many AT workshops rely heavily on the expert rather than training the special education teachers to have long-term knowledge and efficient skills in choosing and implementing the AT services. Most of the time, such expert-based workshops spread awareness among participants at a surface level rather than building or upgrading the participants' knowledge and advanced skills (Parette, Peterson-Karlan, Smith, Gray & Silver-Pacuilla, 2006). Teachers attending AT workshops must be provided with ample opportunities to try a device and receive feedback instantly. Indeed, Edyburn (2005) stated that "learning by doing is essential to the task of building knowledge" (p. 69). Lack of developing a broad-based team of AT skilled teachers will lead to continuing reliance on experts for consultation.

Research related to teachers' training and their use of technology indicates that several barriers have hindered technology integration into teacher education. Those barriers include lack of teacher training, administration support, time for teachers to familiarize themselves with the use of the equipment and software, technical support, funds and budget constraints, and appropriate materials. Still other barriers are limited time for teacher planning, limited availability of equipment and computer placement in remote locations, no clear expectation that faculty will incorporate technology in academic activities, doubt about the validity of using some of the newer technologies, and resistance to change by many educators (Shelly, Cashman, Gunter, & Gunter, 2002). Finally, Kian and Chee (2002) reported that teachers who owned computers and had more computing experience were found to have lower anxiety and more positive attitudes than teachers who had less computer experience.

Statement of the Problem

In spite of the rapid evolution and continued advancement of technology nowadays, many people with disabilities are still deprived of access to technology including necessary assistive technology devices. In addition, many special education teachers and administrators lack the training and knowledge needed to help them choose the adequate tools that match their special needs students' needs in order to maximize their students' long term success. This is particularly the case in the United Arab Emirates where AT is still in its emerging stage. According to the literature reviewed by the researchers, it seems there is a scarcity in studies conducted on the utility of AT in the UAE. Therefore, a study of this nature becomes crucial to the context of UAE and the population of special needs students.

This study aimed at investigating the reality of AT use in the special needs centers in the United Arab Emirates. Although the area of AT integration is still in its infancy, the researchers feel it is an area of utmost importance to the Emirati individuals with special needs in particular, and to the UAE community in general. Therefore, it is worth researching the status of AT because results might shed light on the current practices of AT and its impact on the lives of special needs students.

Research Methodology

Participants

The participants in the present study were special education teachers from special needs centers in the United Arab Emirates. These participants were randomly selected from special needs centers around the country representing five out of the seven UAE Emirates (Ajman, Ras-Al khaimah, Sharjah, Dubai & Fujairah) . Fifty six special education teachers participated in the study. In addition, 8 female special education teachers and 2 male speech therapists were randomly selected for the focus group interviews. Six of the eight special education teachers work in special needs centers and were specialized in teaching students with hearing impairment and students with mental retardation. The other two special education teachers teach students with learning disabilities in special classrooms in the public schools.

Research Questions:

The research questions we explored in this study were:

1. What do teachers consider to be the most used assistive technologies by students with physical disabilities??
2. What do teachers consider to be the most used assistive technologies by students with learning disabilities?
3. What are the barriers that impede effective use of assistive technology as reported by special education teachers?
4. What are special education teachers' perceptions of assistive technology?
5. What are special education teachers' perceptions of the use of assistive technology by special needs students?
6. What are special education teachers' perceptions of parents' attitude towards assistive technology?

Data Collection

To answer the study questions, data were collected from two different sources: Focus group interviews (qualitative) and a questionnaire (quantitative).

1. Focus group interviews with special education teachers and specialists from special needs centers in different Emirates were conducted. The aim of these interviews was to collect detailed data on assistive technology tools and services, and problems hindering their use and implementation.
2. A questionnaire was administered focusing on various types of AT and their impact on special needs students' academic progress, functional skills and communication skills. The

themes of the questionnaire included AT barriers, special education teachers' perceptions of AT and their perspectives on parent attitudes towards the use of AT.

Data Analysis

The current study utilized a mixed research method where quantitative and qualitative data were collected. Descriptive statistics were used for quantitative data analysis (questionnaire) and qualitative data (focus group), utilized a grounded theory method. Grounded theory is one that "is inductively derived from the phenomenon it represents" (Strauss and Corbin, 1990, p23).

Results and Discussion

The first research question was "what do teachers consider to be the most used assistive technologies by students with physical disabilities?" Results showed that there were different types of assistive technologies (AT) being used (see Tables 1, 2, and 3). These technologies can be categorized based on the following types of disabilities: Hearing impairment, visual impairment, physical impairment and learning disability. When we investigated the AT used for helping individuals with hearing impairment, participants reported high percentages for hearing aids, FM systems, and improved classroom sound systems. The percentages of usage were 71.1, 67.5, and 40.5 respectively.

Similarly, when we investigated the percentages for AT for visual disabilities (Table 2), we found that participants reported a number of technologies used for visual disabilities. The most used of the AT devices were auditory materials (58.3%), large print materials (47.2%), Braille typewriter (37.1%), optical aids / magnifiers (28.9%), and Screen magnification software (27.8%).

Results from the focus group interviews indicated that hearing aids, FM systems and sound system improvement are the most commonly used AT devices. This is in accordance with results obtained from the questionnaire. This may be explained by the fact that the category of hearing impairment in the UAE has received more attention compared to other types of disabilities. Over the past decade, more audiologists and speech therapists were recruited in the UAE. As a result, the hearing impaired population has received some more attention. Subsequently, amplification devices have become more available than others for individuals with hearing impairment, particularly the FM system (Easterbrooks, 1999).

Table 1
The use of assistive technologies for individuals with hearing impairment

Variable	% YES NO	
	YES	NO
Hearing Aids	71.1	28.9
FM system	67.5	32.5
Classroom environment sound system improvement	40.5	59.5
Infrared system	11.1	88.9

Table 2

The use of assistive technologies for individuals with visual disabilities

Variable	% YES NO	
	YES	NO
Auditory materials	58.3	41.7
Large print materials	47.2	52.8
Braille typewriter	37.1	62.9
Optical aids / magnifiers	28.9	71.1
Screen magnification software	27.8	72.2
Screen magnifier (mounted over screen)	22.2	77.8
Closed Circuit Television (CCTV)	19.4	80.6
Alternative papers (e.g. raised line, highlighted lines)	18.2	81.8
Braille note-taker	17.6	82.4
Screen reader, text reader	16.7	83.3
Screen color contrast	15.8	84.2
Keyboard using accessibility options	15.8	84.2
Braille embosser	15.2	84.8
Braille translation software	11.8	88.2
Touch screen	10.3	89.7
Dictation software (voice input)	8.6	91.4
Screen color contrast	8.3	91.7
Large letter keyboard	6.1	93.9
Braille/tactile keyboard	6.1	93.9
Scanner w/OCR and text to speech software	5.9	94.1
Slate and Stylus	5.9	94.1
Whiteboard / Writing devices for hard of vision students	5.9	94.1
Special lighting	3.0	97.0
Color contrast screens	2.9	97.1

Table 3

The use of assistive technologies for individuals with physical disabilities

Variable	% YES NO	
	YES	NO
Adapted chair, sidelyer, stander	66.7	33.3
Non-slip surface on chair to prevent slipping	63.9	36.1
Assistive devices to facilitate mobility inside the classroom	54.5	45.5
Switch with Morse code	28.2	71.8
Pencil/pen with adaptive grip	23.5	76.5
Keyboard using accessibility options	15.8	84.2
Touch screen	10.3	89.7
Arm support	8.1	91.9
Mouth stick/head mouse with on-screen keyboard	5.9	94.1
Book adapted for page turning (e.g. page fluffers, 3-ring binder)	5.9	94.1

The second research question was "what do teachers consider to be the most used assistive technologies by students with learning disabilities?" Respondents indicated that ATs most often used to help students with learning abilities were the abacus/math line (67.5%), software for concept development (42.5%), and marker pens (25.0%) (See Table 4).

As for the focus group interviews, results showed that some computer programs (multimedia software) related to the alphabet are the most used AT devices for children with learning disabilities. However, we need to caution that there is a shortage in the quality and quantity of such software. For example, when quality literacy software is available it is usually more commercial and not educational type. In addition, many of these software programs are limited to teaching the alphabet and vocabulary, while the researchers have not come across software programs dealing with phonological awareness.

Table 4
The use of assistive technologies for individuals with learning disabilities

Variable	YES %	NO %
Abacus/Math Line	67.5	32.5
Software for concept development/manipulation of objects	42.5	57.5
Marker pen	25.0	75.0
Calculator with large keys	17.5	82.5
Software to read websites and emails	15.4	84.6
Voice recognition software	15.0	85
Talking calculator	14.3	85.7
Voice output device w/speech synthesis	13.5	86.5
Electronic portable dictionary	11.1	88.9
Communication board/book with pictures/objects/ letters/words	10.0	90
Word prediction, abbreviation/expansion to reduce keystrokes	7.7	92.3
Tactile/voice output measuring devices	7.5	92.5
Portable word processor to keyboard instead of writing	7.5	92.5
Electronic portable thesaurus	5.1	94.9
Software with cueing for math computation (may use adapted input methods)	5.0	95.0
Single word scanners	2.6	97.4

The third research question was "what are the barriers that impede effective use of assistive technology as reported by special education teachers?" Participants reported a number of barriers spreading over four categories: Professional development, equipment availability, administration, and support (see Table 5). This conforms to several findings in the English literature. For example, Edyburn (2004) has clearly emphasized the need to support teachers, parents and administrators when they are making decisions regarding the choice of appropriate tools for struggling students. Similarly, Edyburn (2003; 2005) has repeatedly highlighted the importance of special education teachers and AT specialists to be equipped with up-to-date knowledge and skills when choosing and using AT products. Heyburn stated that in order for special education teachers to be fully competent, they need to move beyond awareness levels of knowledge towards "working knowledge." He listed a number of expectations associated with this "working

knowledge." Some of these expectations are: commitment to learning about AT, instructional applications of AT, decision-making, and advocacy for accessibility.

Results from focus group interviews were in accordance with Edyburn's findings. For example, all participants stated that lack of initial training and sustained professional developments were amongst the most common barriers in addition to the high cost of AT in general.

According to Michaels, Prezanti, Morabito & Jackson (2002) the cost of technology was perceived by the disabled student service providers as the greatest barrier. In addition, Parete et al. (2007) have clearly made the distinction between providing professional development to teachers at a surface level, and sustaining professional development of teachers by exposing them to ample opportunities as well as providing them with feedback.

Table 5
Barriers impeding the use of assistive technology as reported by special education teachers

Variable	M	SD
Professional Development		
There is no in service training on the use of AT.	3.7	1.3
I did not receive enough training to use AT	3.1	1.4
Equipment Availability		
AT is expensive and difficult to obtain	4.1	0.9
AT is not available in the school / center	3.5	1.3
Mobility issues: Difficult to move around equipment and tools	3.3	1.3
Administration		
The current curricula do not include outcomes for AT	3.5	1.2
Administration regulations do not mandate the use of AT	3.1	1.3
Administrators do not support the use of AT	3.0	1.3
Support		
Lack of technical assistance	4.2	1.0
School environment is not technically prepared for the use of AT	4.0	1.0
AT available now is often damaged and needs maintenance	3.7	1.2

The fourth research question was, "what are special education teachers' perceptions of assistive technology?" Our results showed that special education teachers had positive attitudes regarding the AT used to help students with special needs. Results revealed high mean scores of items that support the use of AT with students to improve their learning. Teachers in this study support the use of AT in the classroom, and recognize the importance and utility of using AT to help them teach as well as its motivational impact on student achievement (See Table 6). The mean scores for these items on the survey were 4.6 and above on a 5-point scale extending from extremely low (1) to extremely high (5). In a study by Kian and Chee (2002), positive attitudes were found with professionals who own and use computers. There is no doubt that positive attitudes when coupled with adequate professional training and support will lead to better results in the utilization of AT.

Results from the survey of teachers' perceptions and AT use are in alignment with results collected from the focus group interviews where participants collectively supported the use of AT. All interviewed participants stated that the use of AT, when it is available, facilitates their work and enhances learning for the special needs students.

Table 6
Special education teachers' perceptions of assistive technologies

Variable	M	SD
I support the use of AT in the classroom	4.7	0.7
AT is important and useful for students with special needs	4.7	0.7
AT assists me when teaching students with special needs.	4.7	0.7
AT has a positive impact on students motivation and achievement	4.6	0.7
Knowledge about AT will improve my practice	4.6	0.7
AT assists the students with special needs to overcome their disability or weakness.	4.0	1.1
AT is safe to use	3.9	1.0
AT is easy to use.	3.7	1.0
AT requires a lot of time	3.0	1.3
The use of AT is demanding	2.9	1.3
Available AT is appropriate to the type of the disability students with special needs have.	2.8	1.4
Students with special needs have other priorities that are more important than AT	2.7	1.1
The use of AT is additional work for the teacher and needs additional time which is not available to the teacher.	2.2	1.2
Using AT disturbs other classroom peers	2.1	1.1
Using AT delays the completion of the curriculum on time	1.8	0.9
It is not my duty as a teacher to use AT in teaching students with special needs.	1.7	0.9
AT does not help students in their academic achievement	1.7	1.0
I'm not convinced that assistive technology is important in teaching students with special needs	1.5	0.8

The fifth research question was, "what are special education teachers' perceptions of special needs students' use of assistive technology?" Results showed that teachers' perceptions are not positive pertaining to the use of AT by special needs students (see Table 7). This is due to several factors. Mainly, students with special needs are not fully trained to use or maintain their AT devices. This issue is of high importance if an AT device was to be used to maximize its benefit. In fact, in a study by Michaels, Prezant, Morabito and Jackson (2002), the researchers underscored the need for students with special needs to be fully knowledgeable about AT devices and their usage if they want to become lifelong learners who can use and manipulate information now and in the future. Providing access to AT alone is not the resolution. Expertise in its usage must be aligned closely with its importance. This may be of a more pressing issue considering the rapid continuous changes taking place in the field of AT.

In addition, special needs students seem to experience negative emotions when using AT, which can be attributed to the lack of awareness and stigma associated with disability. Indeed, the stigma associated with disabilities can have an adverse effect on the social well being of the person with disability (McLaughlin, Bell & Stringer, 2004; Tibi, 2005).

The speech therapists interviewed in this study clearly stated that the hearing impaired students felt ashamed when having to use hearing aids or other hearing devices. This is because it makes them look different from the others. This may be attributed to the lack of awareness and negative attitudes towards individuals with disabilities in general. Furthermore, 80% of the interviewed participants stated that students do not receive enough training as to the appropriate use and maintenance of AT. These findings conform to results obtained from the questionnaire items (see Table 7).

Table 7
Special education teachers' perceptions of special needs students' use of assistive technology.

Variable	M	SD
Students are not fully trained to use AT	3.4	1.1
Students often misuse AT devices which lead to damaging equipments	3.8	1.0
Students feel shy about using AT because it makes them look different	2.9	1.1
Classroom peers often make fun of students who use AT	2.6	1.0

The sixth research question was, "what are special education teachers' perceptions of parents' attitudes towards assistive technology?" Results showed that teachers have very low perceptions of parents' attitudes towards AT. Mean scores on all items of teachers' perceptions were 2.5 or lower (Table 8). This indicates that parents may lack awareness as to the use of AT, its types, value, and the impact it leaves on enhancing their children's performance when using it appropriately. The implication of this finding is that parents must be educated about the availability of AT products and their benefits. This can be accomplished by inviting parents to an open-day at the center/school where such AT tools can be shown to them. Moreover, parents can be informed as to what types of support services that exist to promote their children's performance across tasks that may be otherwise impossible. Many parents of special needs children are not experts in using assistive technology. According to Edyburn (2003), "Parents are in desperate need of easy-to-use decision-making tools that help them identify categories of products that may be useful for individuals or groups of struggling students"(p. 22).

Of the 10 interviewed professionals (100%) stated that parents of students with special needs lack the basic knowledge and skills of AT and its impact on their children. This qualitative result confirms the above quantitative results obtained by the questionnaire.

Table 8

Special education teachers' perceptions of parents' attitude towards assistive technology.

Variable	M	SD
Parents' expectations about the use of AT are realistic	2.5	1.0
Parents seeking information about AT needed for their sons / daughters.	2.4	1.3
Parents are aware of the importance of using AT	2.3	1.1
Parents request information on the benefit of AT	2.3	1.2
Parents are up to date on the advances in of AT used by their child	2.2	1.1
Parents are fully aware of how, when and where AT can be used	2.2	1.0
Parents propose solutions to the difficulties faced by the teacher or student on the use of AT in the classroom.	2.1	1.0
Parents contribute to pay for their child's AT	2.1	1.0
Parents trained in the use of AT and provide assistance to their children	1.9	.9
Parents can maintain AT and can identify malfunctions	1.9	.9

Conclusion

Findings of the current study shed some light on the status of AT devices in the UAE, and the perceptions of special education teachers and specialists towards these devices and their usage. In addition, some barriers hindering the use of AT were identified. The most prominent barriers revolved around issues of professional development, availability of devices, administration support and technical support. In addition, there were some barriers identified as the causes of the negative perceptions held by special needs teachers towards their special needs students and their parents. These barriers were mainly related to issues of awareness of AT devices and their impact on students' performance. Furthermore, Students' lack of knowledge and expertise in using the devices and maintaining them was perceived by teachers as a hindrance in the effective and efficient use of the AT devices.

Subsequently, adequate selection and use of AT when accompanied with professional training and administrative and technical support allow individuals who use AT to enhance their performance. Ultimately, the aim behind using AT is to overcome performance problems as much as possible. A large body of research has documented success stories for learning, enjoyment, communication, and the enhancement of other life skills when individuals with disabilities use AT efficiently.

Based on the findings from the study and the reviewed literature, the researchers suggest the following recommendations for optimal use of AT devices in the future. The following recommendations are directed towards all concerned members in the community, particularly, stakeholders, special needs advocates, parents of special needs students, professionals and paraprofessionals.

- 1- Increase public awareness to AT devices and its impact on people's lives.
- 2- Advocate for the right of individuals with special needs to use AT
- 3- Draft laws specific to the right of individuals to be provided with AT devices and services.
- 4- Provide professional training for students using AT devices.
- 5- Provide professional development and follow-up for service providers in the area of AT.

- 6- Educate parents as to the importance of AT to their children's performance, and provide opportunities for parents to seek help when facing difficulties or queries regarding AT.
- 7- Design specifically for the Arabic context (language and culture).

The current study focused on the status of AT devices in the UAE, barriers in using them, and the perceptions of some professionals working with special needs individuals towards AT in general. Future research in this area in the UAE is warranted. For example, more research is needed to investigate:

- 1- Differences between male and female special needs students' usage of AT
- 2- The availability and usage of AT devices in the special education classroom in the regular public schools.
- 3- The status of AT usage through real-time classroom observations.
- 4- The role of professional Development in teacher's awareness of AT.
- 5- The special needs students' attitudes towards the use of AT devices.
- 6- The attitudes of the parents towards AT devices and services available to their children.
- 7- The area of alternative and augmentative communication (AAC).

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